

**EPA**United States Environmental Protection Agency  
Washington, DC 20460**Work Assignment**

Work Assignment Number

1-28

☐

Other

☐

Amendment Number

Contract Number

EE-W-13-002

Contract Period

11/19/2009 To 11/18/2014

Title of Work Assignment/SF Site Name

Natr. Redu-Narragansett Bay

Base

Option Period Number

1

Contractor

INDUSTRIAL ECONOMICS, INCORPORATED

Specify Section and paragraph of Contract SOW

Pages 3-7, Element 1

Purpose

☒

Work Assignment

☐

Work Assignment Close-Out

☐

Work Assignment Amendment

☐

Incremental Funding

☐

Work Plan Approval

Period of Performance

From 07/15/2011 To 11/18/2011

Comments

The purpose of this action is to initiate Work Assignment 1-28. The Contractor shall provide a cost estimate and work plan in accordance with the Contract.

☐

Superfund

## Accounting and Appropriations Data

☒

Non-Superfund

SFO  
(Max 2)☐

Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

## Authorized Work Assignment Ceiling

Contract Period

Cost/Fee:

LOE 0

11/19/2009 To 11/18/2014

This Action:

1,726

Total:

1,726

## Work Plan / Cost Estimate Approvals

Contractor WP Dated:

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee:

LOE:

Work Assignment Manager Name Montira Pongsiri

Branch/Mail Code:

Phone Number 202-564-0978

FAX Number:

(Signature)

(Date)

Project Officer Name Cathy Turner

Branch/Mail Code:

Phone Number 202-566-0951

FAX Number:

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

FAX Number:

(Signature)

(Date)

Contracting Official Name Carol Rodgers

Branch/Mail Code:

Phone Number 202-564-4781

FAX Number:

(Signature)

(Date)

Work Assignment Form (WebForms v10)

## **WORK ASSIGNMENT**

**Title:** Planning and Management Support for Innovative Application of Systems Thinking to Nutrient Reduction in the Narragansett Bay and Watershed (Phase 1)

**Contractor:** Industrial Economics, Incorporated (IEC)

**Contract No.:** EP-W-10-002

**Work Assignment Number:** 1-28

**Estimated Period of Performance:**    Date of issuance: **Approval** to: 11/18/2011

**Estimated Level of Effort:** 1726 hours

**Key EPA Personnel:** The EPA technical representatives will be Joseph Fiksel of the Ohio State University, who is currently serving on an IPA as sustainability advisor to EPA, Margherita Pryor, [Title], Beth Termini, Senior Advisor to the Region 1 Deputy Regional Administrator and the Office of Policy, and Gary Foley, Senior Advisor to ORD. EPA technical representative(s) designated by the EPA WA COR is solely for the purpose of presenting and discussing the information, analyses, results, or presentations related to this work assignment. The interaction will be technical communication versus technical direction.

**Work Assignment COR (WA COR):**        Montira J. Pongsiri, PhD, MPH  
U.S. Environmental Protection Agency  
Office of the Science Advisor  
(tel) 202 564 0978  
(fax) 202 564 2070  
pongsiri.montira@epa.gov  
Mailing Address):  
1200 Pennsylvania Ave. NW  
Mail Code 8105R  
Washington, DC 20460-0001

**Contract Level COR:**                    Catherine Turner  
OP (1805T)  
202/566-0951  
202/566-3001 (fax)

### **Background and Purpose:**

To promote the discovery and implementation of innovative approaches to nutrient reduction in New England, EPA will require technical support for multifaceted activities across the whole innovation cycle. The innovation cycle includes five different elements; however, this Work Assignment is solely for the first element of the innovation cycle: Planning and managing

innovation.

### ***Nature of the Problem to be Addressed by the Work Assignment***

In applying innovation to solve EPA's challenging problems, EPA-New England is engaged in a variety of initiatives that are relevant to the pursuit of sustainability in the New England region. At the same time, and for the same reason, the Office of Research and Development (ORD) has been developing a holistic approach to sustainable solutions based on systems thinking. The timing of these parallel efforts provides an opportunity for ORD to assist Region 1 in articulating and implementing an integrated approach toward Regional sustainability in specific problem areas. The initial focus of this work is on the problem of nutrient impairment in New England waters, and the aim of this pilot effort is to help avoid, reduce, and manage nutrient impacts to Narragansett Bay and its watershed.

It is well known that anthropogenic releases of nutrients, including nitrogen and phosphorus compounds, are degrading U.S. waterways. Significant sources of nutrient emissions include fertilizers, ammonia, and industrial wastes associated with agriculture, livestock, forestry, fisheries, food, beverages, and various sectors of the chemical and pharmaceutical industries. In addition, municipal wastewater treatment plants discharge large amounts of nitrogen compounds into the nation's rivers and lakes. These excess nutrients can cause algae blooms that degrade or destroy aquatic ecosystems, and such impacts are visible in Narragansett Bay and other New England water bodies.

### ***Scope of the Work Assignment***

As EPA undertakes this innovative engagement to address the specific problem described above, and to demonstrate the application of systems thinking to sustainability, EPA will require contractual support under this Work Assignment from experts in various activities, such as, but not limited to, the following:

- identification of key sustainability indicators—ecological, economic, and social—that are relevant to Regional stakeholder groups,
- modeling of inter-related impacts and feedback loops among current and potential options to address the nutrient problem, and
- holistic assessment of expected benefits to the Region as a whole.

The expected outcome of this effort will be a cohesive strategy for achieving progress toward nutrient reduction, encompassing overall environmental improvements as well as future economic and social development. The project will not only support effective policy and decision making within EPA-New England, but can also serve as a model for other EPA Regions that are exploring similar challenges.

ORD has developed a scheme for systems thinking that expands upon the classic risk assessment and management paradigm and supports the realization of sustainable solutions. The System Characterization stage defines the scope and context of the system, identifies sustainability goals, and develops an integrated problem formulation. In the case of nutrient mitigation, the approach

should consider not only affordability and the expected reduction in nutrient levels, but also potential indirect consequences such as displacement of jobs or creation of new business opportunities. The subsequent stages of the process are Sustainability Assessment, involving analysis of alternative sustainable solutions, Sustainability Enhancement, involving implementation of the chosen intervention, and System Adaptation, involving progress monitoring and response to changing conditions. The process may require cyclical iterations to revisit prior decisions and to assure the resilience of both economic and ecological systems. Of course, stakeholder involvement throughout this process is a critical success factor.

The work assignment will provide expert support for the first two stages of the above process, in order to establish the necessary knowledge and tools to support implementation of the latter two stages by EPA along with State and local partners. Information to be developed in the work assignment includes:

- Current baseline conditions for nutrient pollution, and potential adverse human or ecological impacts associated with impaired surface water and groundwater.
- Ecological and geophysical characteristics that influence nutrient impacts in the watershed, including the north-to-south gradient of impairments and unique local conditions that need to be considered.
- Important system characteristics, including point and non-point sources, fisheries, wastewater treatment technologies (including on-site and decentralized systems), stormwater management, agricultural practices, and patterns and impacts of development, including infrastructure related to land use, transportation, climate change, and demographic changes.
- Identification of stakeholder groups with the aim of capturing diverse perspectives, including users, technical experts, and community leaders who can serve as early adopters and builders of innovative strategies.
- Establishment of key objectives and measurable indicators—environmental, economic, and social.
- Analysis of potential instruments for nutrient reduction and impact mitigation, including narrative standards, numeric regulatory criteria, infrastructure improvements, voluntary reduction programs, economic incentives, innovative technologies, and other possible interventions by governmental or non-governmental organizations.
- Hidden implications of nutrient reduction strategies, e.g., product life cycle consequences of regulatory restrictions and changes in practices.
- Relative risks, costs and benefits of alternative strategies, including anticipated system resilience in the face of changing economic patterns, demographics, climate, and other factors, and the distribution of those risks, costs, and benefits among

various stakeholder groups.

To support the Sustainability Realization process, ORD has developed a conceptual model that depicts resource flows and causal linkages among industrial, societal, and environmental systems. In order to focus on the nutrient problem, this model will be customized into a more detailed, problem-specific form, showing the relevant ecosystem services, economic activities, waste streams, transport and fate mechanisms, and human or environmental consequences. The contractor shall produce and refine the more detailed form of this model.

As the Sustainability Realization process moves from the System Characterization to the Sustainability Assessment and Enhancement stages, analytic tools can be used to model the interactions among socioeconomic drivers, environmental pressures, and sustainability outcomes. One promising approach is to use integrated assessment modeling based on system dynamics, exemplified by the T21-Ohio model that is being applied to support energy and economic policy in the State of Ohio, as well as the global “green economy” model that was developed by the United Nations Environmental Programme.

For purposes of analyzing nutrient-related policies and strategies, the contractor shall utilize system dynamics and related tools to develop an integrated model that supports evaluation of nutrient reduction alternatives for the Narragansett Bay watershed, including the 60 percent of the watershed that lies in Massachusetts. Rather than a detailed numerical simulation, this model will provide a holistic, aggregated analysis of the expected environmental, economic, and social consequences of different alternatives. However, the model will be capable of incorporating the results of more detailed analyses, such as finite-element simulations of nutrient impacts on water quality. The model will have an interactive human interface that permits real-time investigation of different alternatives and key assumptions. Thus, we anticipate that this model will be useful as a strategic tool in evaluating overall sustainability enhancement opportunities. At the same time, it will represent an innovative research product that can be adapted to other watersheds in EPA-New England and elsewhere, and can be extended to perform broader analysis of sustainable solutions.

## **Tasks and Deliverables:**

### ***Practical Objectives***

The main focus of this effort will be on the System Characterization and Sustainability Assessment, laying the groundwork for Sustainability Enhancement decision making and longer-term System Adaptation. The specific objectives and tasks undertaken in this effort will be the following:

- **EPA will** - Identify initial lists of the key issues, current conditions, concerned stakeholders, alternative interventions, potential sustainability indicators, and sources of information to support the investigation.

- **The Contractor shall** – Develop a detailed conceptual model to represent the subsystems, resource flows, and watershed issues of concern, and develop a corresponding system dynamics model using a standard commercial platform (e.g., VENSIM). The model will support the approximate estimation of sustainability indicators at an aggregate watershed level, and will provide an interactive human interface to support evaluation of alternatives and strategic decision making.
- **The Contractor shall** – Apply the model in an iterative fashion to support assessment of the potential contributions of current and potential nutrient reduction initiatives by EPA and other entities, thus revealing benefits, barriers, and potential synergies and/or conflicts among these initiatives.
- **The Contractor shall** – Highlight important interdependencies and develop future scenarios that take into account the relationships between environmental improvement, future economic growth, and societal expectations in New England communities
- **The Contractor shall** – Develop and articulate options for a cohesive, systemic strategy for achieving progress in nutrient reduction, consistent with EPA's established programs and policies
- **The Contractor shall** – Building on this pilot effort, develop guidance for ORD and EPA-New England to deliver to other EPA Regions that wish to apply systems thinking for development of sustainable solutions to similar environmental challenges.

***Expertise Required for Performing work under this work assignment.***

The scope of work requires skills and proficiencies in a variety of substantive areas, as well as project management and literature research and analysis. These include the following:

Substantive expertise in the following areas:

- Industrial process engineering and pollution prevention technologies, including wastewater treatment.
- Human and environmental exposure and risk assessment for waterborne pollutants and pathogens.
- Water quality science, technology, policy, and regulations, particularly related to the nutrient impairment issues.
- Sources, mechanisms, and impacts of nutrient impairment in aquatic ecosystems.
- Analysis and mitigation alternatives for nitrogen and phosphorous impairments in coastal waters.
- Sustainability assessment, including development and use of social, economic and

environmental indicators to evaluate the outcomes of policy and technology changes.

#### Project management and execution proficiencies

- Strong interpersonal and communication skills, including facilitation and consensus building, for working with government representatives and stakeholders.
- Strong qualitative and quantitative analytic skills, including statistical analysis
- Expertise in modeling, computer simulation and graphic presentations, specifically including the use of system dynamics for environmental policy analysis
- Understanding of and significant expertise in the application of systems thinking to complex problems

The WA COR will review all deliverables in draft form and provide revisions and/or comments to the contractor. The contractor shall prepare the final deliverables incorporating the WA COR's comments.

The contractor shall at all times identify themselves as Contractor employees and shall not present themselves as EPA employees. Furthermore, they shall not represent the views of the U.S. Government, EPA, or its employees. In addition, the Contractor shall not engage in inherently governmental activities, including but not limited to actual determination of EPA policy and preparation of documents on EPA letterhead.

### **QUALITY ASSURANCE (QA) REQUIREMENTS**

Check ☒ YES or ☐ NO, if the following statement is true or false. The Contractor shall submit a written Quality Assurance Project Plan for any project that is developing environmental measurements or a Quality Assurance Supplement to the Quality Management Plan for any project which generates environmental data using models with their technical proposal. This plan will be submitted within 30 calendar days of receipt of work assignment.

#### **Task 1 - Prepare Workplan**

The contractor shall prepare a workplan within 15 calendar days of receipt of a work assignment signed by the Contracting Officer. The workplan shall outline, describe and include the technical approach, resources, timeline and due dates for deliverables, a detailed cost estimate by task and a staffing plan. The WA COR, the PO, and the CO will review the workplan. However, only the CO can approve/disapprove, suggest revisions, or change the workplan. Official revisions will be given to the contractor by the Contracting Officer. The contractor shall prepare a revised workplan incorporating the Contracting Officer's comments, if required.

**Task 1 Deliverables:**

**1a. Workplan within 15 calendar days of receipt of work assignment due to the WA COR.**

**1b. Revised workplan due to the WA COR within 3 calendar days of receipt of comments from the WA COR, if required.**

**1c. Quality Assurance plan within 30 calendar days of receipt of work assignment due to the WA COR.**

**Task 2 - System Characterization Report** (this work falls under Contract Statement of Work page 4 and 6, Section III, Element 1: Planning and management support, 1. Research, 5. Reports)

The contractor shall prepare a System Characterization report, based on initial information provided by EPA. The contractor shall include results of literature research and data collection regarding nutrient-related issues, current watershed conditions, alternative interventions, recommended indicators, and stakeholder concerns.

A detailed conceptual model of resource flows and watershed issues of concern, as a basis for system dynamics modeling, shall be included in above System Characterization report.

**Task 2 Deliverables:**

**2a. Draft System Characterization report within 2 months after initiation of the WA due to the WA COR.**

**2b. Final version of the report within 2 weeks after receipt of EPA comments due to the WA COR.**

**Task 3 – System Dynamics Model** (this work falls under Contract Statement of Work page 4 and 6, Section III, Element 1: Planning and management support, 1. Research)

The contractor shall provide a System Dynamics model based on a standard commercial platform, with an interactive human interface to support evaluation of alternatives at an aggregate watershed level.

The contractor shall apply the model in an iterative fashion to support assessment of current and potential nutrient reduction initiatives.

**Task 3 Deliverables:**

**3a. Provide an initial operational prototype within 3 months after initiation of the WA due to the WA COR.**



**3b. Provide a fully operational model by the end of the performance period of the WA due to the WA COR.**

**3c. Provide weekly reports due to the WA COR of the results from the application of the model in an iterative fashion to support assessment of current and potential nutrient reduction initiatives.**

**Task 4 - Stakeholder Workshops/Public Meetings** (this work falls under Contract Statement of Work page 7, Section III, Element 1: Planning and management support, 3. Data gathering and information management)

The contractor shall organize up to 3 stakeholder workshops and/or public meetings, including securing facilities and managing the logistics. A Stakeholder Meeting is used to inform the Stakeholders about the work by EPA and by the contractor that will be done under the Narragansett Bay project. The Stakeholders are not invited as speakers nor as a committee. They are invited as individuals. All of the Stakeholders coming to this meeting are local and will not be traveling at EPA or contractor expense. The Stakeholders may participate in the open discussions, if they wish, and speak as individuals.

**Task 4 Deliverables:**

**4a. Draft Workshop/Meeting report within 5 calendar days after the end of workshop/meeting due to the WA COR.**

**4b. Final version of the report within 3 days after receipt of EPA comments due to the WA COR.**

**Task 5 - Periodic EPA Teleconferences & Face-to Face meetings** (this work falls under Contract Statement of Work pages 3-7, Section III, Element 1: Planning and management support)

The contractor shall travel to a one-day EPA stakeholder meeting in Narragansett, Rhode Island on July 27 to provide notetaking support.

The contractor shall participate in the periodic teleconferences and face-to-face meetings. If requested by the WA CORs, draft meeting summaries shall be prepared, then finalized based on EPA comments and provided to the WA CORs.

**Task 5 Deliverables:**

**5a. Stakeholder meeting notes (July 27 meeting) due to the WA COR within 15 calendar**

**days after the end of the meeting.**

**5b . Draft meeting summaries within 2 days after the end of the meeting due to the WA COR.**

**5c . Final version of the summary within 2 days after receipt of EPA comments due to the WA COR.**

**Task 6 - Final Report** (this work falls under Contract Statement of Work page 6, Section III, Element 1: Planning and management support, 5. Reports)

The contractor shall provide a draft final report describing the technical work performed and recommended options for nutrient reduction, with rationale. The report should also include a description of other model applications and analysis that could be performed in the future and the potential benefit of doing this additional work. If requested by the WA CORs, the report should include preliminary draft guidance document for other EPA Regions to use to apply systems thinking for sustainable solutions.

**Task 6 Deliverables:**

**6a. Draft final report at least two weeks before the end of the performance period due to the WA COR.**

**6b. Final report within 4 days after receipt of EPA comments due to the WA COR.**

**EPA**United States Environmental Protection Agency  
Washington, DC 20460**Work Assignment**

Work Assignment Number

C-28



Other



Amendment Number

Contract Number

EP-W-11-003

Contract Period 11/03/2010 To 11/02/2012

Base ☒

Opt on Period Number

Title of Work Assignment/SF Site Name

Data Anal. &amp; Logistics - TRI

Contractor

ABT ASSOCIATES INC

Specify Section and paragraph of Contract SOW

Pg. 5 (para. A, B), Pg. 10-11 (para. A, B, D, E, F, G)

Purpose



Work Assignment



Work Assignment Close-Out



Work Assignment Amendment



Incremental Funding



Work Plan Approval

Period of Performance

From 09/30/2011 To 11/02/2011

Comments

The purpose of this amendment to Work Assignment C-28 is to approve the Contractor's work plan and cost estimate dated September 30, 2011 for 780 hours level of effort, (b)(4) in costs, (b)(4) in fee with a ceiling of \$78,426.



Superfund

Accounting and Appropriations Data



Non-Superfund

SFO  
(Max 2)

Note: To report additional accounting and appropriations data use EPA Form 1900-69A

LINE	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

## Authorized Work Assignment Ceiling

Contract Period:

Cost/Fee \$0.00

LOE:

11/03/2010 to 11/02/2012

This Action

\$78,426.00

Total:

\$78,426.00

## Work Plan / Cost Estimate Approvals

Contractor WP Dated:

09/30/2011

Cost/Fee \$78,426.00

LOE 780

Cumulative Approved

Cost/Fee \$78,426.00

LOE 780

Work Assignment Manager Name Kara Koehn

Branch/Mail Code

Phone Number 202-566-0310

FAX Number:

(Signature)

(Date)

Project Officer Name Cathy Turner

Branch/Mail Code

Phone Number 202-566-0301

FAX Number:

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

(Signature)

(Date)

FAX Number:

Contracting Official Name Sam Rodgers

Branch/Mail Code:

Phone Number 202-564-4781

FAX Number:

(Signature)

(Date)

Work Assignment Form (WebForms v1.0)

**EPA**United States Environmental Protection Agency  
Washington, DC 20460**Work Assignment**

Work Assignment Number

1-28

☐ Other ☒ Amendment Number:

000001

Contract Number

SP-W-10-002

Contract Period 11/19/2009 to 11/18/2014

Base Option Period Number 1

Title of Work Assignment/SF Site Name

Nulr. Redu-Narragansett Bay

Contractor

INDUSTRIAL ECONOMICS, INCORPORATED

Specify Section and paragraph of Contract SOW

Pages 3-7, Element 1

Purpose:

☐

Work Assignment

☐

Work Assignment Close-Out

☒

Work Assignment Amendment

☐

Incremental Funding

☐

Work Plan Approval

Period of Performance

From 07/15/2011 To 11/18/2011

Comments:

The purpose of this amendment to Work Assignment 1-28 is to add 83 level of effort hours at no additional cost to the Government.

☐

Superfund

Accounting and Appropriations Data

☒

Non-Superfund

SFO  
(Max 2)☐

Note: To report additional accounting and appropriations data use EPA Form 1800-69A.

g u	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 8)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

## Authorized Work Assignment Ceiling

Contract Period

Cost/Fee:

LOE:

11/19/2009 to 11/18/2014

This Action

Total:

## Work Plan / Cost Estimate Approvals

Contractor WP Dated:

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee

LOE:

Work Assignment Manager Name Montara Pongsiri

Branch/Mail Code:

Phone Number 202-564-0978

FAX Number:

(Signature)

(Date)

Project Officer Name Cathy Turner

Branch/Mail Code:

Phone Number: 202-566-0951

FAX Number:

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code:

Phone Number:

FAX Number:

(Signature)

(Date)

Contracting Official Name Jami Rodgers

Branch/Mail Code:

Phone Number: 202-564-4781

FAX Number:

(Signature)

(Date)